OPTIMAL EXTENSION OPERATORS FOR HIGH ORDER TETRAHEDRAL ELEMENTS

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The goal of this work is the construction of fast iterative solvers for matrix equations arising from high order finite elements. We focus on cheap block-Jacobi and block-Gauss-Seidel iterations, where the blocks are defined by the shape functions associated to edge-, face- and interior-nodes. Of course, the speed of convergence depends on the choice of the shape functions.
We present new shape functions leading to optimal iteration numbers. The construction is based on polynomial extension operators. By the help of symbolic computing we could derive cheap recursion formulas for the efficient computation of the shape functions.
Numerical results for 3D problems are presented.

References

[1] A. Bećirović and J. Schöberl, "Hierarchical shape functions based on explicit extension operators", *SFB-Report 03xx, Johannes Kepler University Linz*, 2003.